1. A method for modulating a polarization-multiplexed optical clock signal for an optical communication system, the method comprising:

a) splitting a linearly polarized input optical clock signal having a clock rate into a first and a second linearly polarized optical signal, wherein the first linearly polarized optical signal comprises a first polarization state and the second linearly polarized optical signal comprises a second polarization state;

b) delaying the first linearly polarized optical signal relative to the second linearly polarized optical signal;

c) combining the first and the second linearly polarized optical signals to generate the polarization-multiplexed optical clock signal for the optical communication system; and

d) modulating the polarization-multiplexed optical clock signal with a polarization-insensitive optical modulator to encode data on the polarization-multiplexed optical clock signal.

2. The method of claim 1 wherein the first polarization state is orthogonal to the second polarization state.

3. The method of claim 1 wherein at least one of the first and the second linearly polarized optical signals is controllably attenuated.

4. The method of claim 1 wherein the delaying of the first linearly polarized optical signal relative to the second linearly polarized optical signal comprises propagating the first and the second linearly polarized optical signals along a first and a second optical path, respectively, wherein an optical path length of the first optical path is not equal to an optical path length of the second optical path.

5. The method of claim 1 wherein the delaying of the first linearly polarized optical signal relative to the second linearly polarized optical signal comprises propagating the first and the second linearly polarized optical signals through a

first and a second polarization plane, respectively, of a birefringent medium, the first and the second polarization planes being characterized by a first and a second propagation velocity of light, respectively.

6. The method of claim 1 wherein the combining of the first and the second linearly polarized optical signal to generate the polarization multiplexed optical clock signal comprises rotating at least one of the first and the second polarization states.

7. The method of claim 1 wherein the polarization-multiplexed optical clock signal has a clock rate that is substantially twice the clock rate of the input optical clock signal.

8. The method of claim 1 wherein the polarization-multiplexed optical clock signal has a clock rate that is more than twice the clock rate of the input optical clock signal.

9. A polarization-multiplexed optical data modulator comprising:

a) an optical clock that generates an optical clock signal having a clock rate at an optical clock output;

b) a polarization multiplexer having an input that is optically coupled to the optical clock output, the polarization multiplexer generating a polarization-multiplexed optical clock signal having a clock rate at a polarization multiplexer output; and

c) a polarization-insensitive optical data modulator having an optical input that is optically coupled to the polarization multiplexer output, the polarization-insensitive optical data modulator modulating the polarization-multiplexed optical clock signal with a data signal.

10. The data modulator of claim 9 wherein the polarization multiplexer comprises a birefringent medium having a first and a second polarization plane characterized by a first and a second propagation velocity of light, respectively.

11. The data modulator of claim 10 wherein the birefringent medium comprises a polarization-maintaining optical fiber having a first and a second polarization plane.

12. The data modulator of claim 11 wherein the second polarization plane is substantially orthogonal to the first polarization plane.

13. The data modulator of claim 11 wherein the first and the second polarization planes of the polarization-maintaining optical fiber are oriented at substantially forty-five degrees relative to a plane of polarization of the optical clock signal.

14. The data modulator of claim 11 wherein an angle of the first and the second polarization planes of the polarization-maintaining optical fiber relative to a plane of polarization of the optical clock signal is adjustable.

15. The data modulator of claim 9 wherein the polarization multiplexer comprises:

a) an optical beamsplitter that splits the optical clock signal into a first and a second optical signal;

b) a first and a second polarization-maintaining optical fiber that receives the first and the second optical signals, respectively, an optical path length of the first polarization-maintaining optical fiber being different from an optical path length of the second polarization-maintaining optical fiber by an optical path difference, wherein the first optical signal is delayed relative to the second optical signal by a time that is proportional to the optical path difference; and

c) an optical combiner that combines the first and the second optical signals.

16. The data modulator of claim 9 wherein the polarization-multiplexed optical clock signal has a clock rate that is substantially twice the clock rate of the optical clock signal.

17. The data modulator of claim 9 wherein the polarization-multiplexed optical clock

signal has a clock rate that is more than twice the clock rate of the optical clock signal.

18. The data modulator of claim 9 wherein the polarization multiplexer further comprises an adjustable optical attenuator.

19. A polarization-multiplexed optical data modulator comprising:

a) an optical clock that generates a linearly polarized optical signal having a clock rate at an optical clock output;

b) a birefringent medium having an input that is optically coupled to the optical clock output, the birefringent medium having a first and a second polarization plane characterized by a first and a second propagation velocity of light, respectively, wherein the linearly polarized optical signal is split into a first optical signal and a second optical signal that propagate in the first and the second polarization planes, respectively, thereby generating a polarization-multiplexed optical signal at an output; and

c) a polarization-insensitive optical modulator having an input that is optically coupled to the output of the birefringent medium.

20. The data modulator of claim 19 wherein the second polarization plane is substantially orthogonal to the first polarization plane.

21. The data modulator of claim 19 wherein the birefringent medium comprises a polarization-maintaining optical fiber.

22. The data modulator of claim 19 wherein the birefringent medium comprises a birefringent crystal.

23. The data modulator of claim 19 further comprising a single-mode optical fiber having an input that is optically coupled to the output of the birefringent medium and an output that is optically coupled to the polarization-insensitive optical modulator.

modulator.

24. The data modulator of claim 19 further comprising a planar lightwave circuit having an input that is optically coupled to the output of the birefringent medium and an output that is optically coupled to the input of the polarization-insensitive optical modulator.

25. The data modulator of claim 19 further comprising a polarization-maintaining optical fiber having an input that is optically coupled to the output of the birefringent medium and an output that is optically coupled to the input of the polarization-insensitive optical modulator.

26. The data modulator of claim 19 further comprising a second birefringent medium having an input that is optically coupled to the output of the birefringent medium and an output that is optically coupled to the input of the polarization-insensitive optical modulator.

27. The data modulator of claim 19 further comprising an optical attenuator having an input that is optically coupled to the output of the birefringent medium and an output that is optically coupled to the input of the polarization-insensitive optical modulator.

28. The data modulator of claim 19 further comprising an optical signal monitor that is optically coupled to the output of the birefringent medium.

29. The data modulator of claim 19 wherein a polarization angle of the linearly polarized optical signal generated by the optical clock is substantially forty-five degrees relative to the first and the second polarization planes of the birefringent medium.

30. The data modulator of claim 19 wherein the first polarization plane of the birefringent medium is substantially orthogonal to the second polarization plane.

31. The data modulator of claim 19 further comprising a second polarization-insensitive optical modulator having an input that is optically coupled to the

output of the birefringent medium.

32. A polarization-multiplexed optical data modulator comprising:

a) a means for generating an optical clock signal comprising a train of optical pulses having a polarization state;

b) a means for optically splitting the optical clock signal into a first optical signal and a second optical signal, each of the first and the second optical signals having a first and a second polarization state, respectively;

c) a means for delaying the first optical signal relative to the second optical signal;

d) a means for rotating the first polarization state of the first optical signal relative to the second polarization state of the second optical signal, wherein the rotating of the first polarization state relative to the second polarization state orients the first polarization state substantially orthogonal to the second polarization state;

e) a means for optically combining the first optical signal and the second optical signal to generate the polarization-multiplexed optical clock signal; and

f) a means for modulating the polarization-multiplexed optical clock signal with a data signal.

33. The polarization-multiplexed optical data modulator of claim 32 wherein the means for modulating the polarization-multiplexed optical clock signal with a data signal is insensitive to the polarization state of the polarization-multiplexed optical clock signal.

34. The polarization-multiplexed optical data modulator of claim 32 further comprising a means for attenuating at least one of the first and the second optical signals.